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Introduction

Technological advances over the past thirty years have given rise to new forms of media—video games, interactive video installations, virtual reality, and computer-based art—that some enthusiastic commentators see as harboring revolutionary artistic potential. The concept of “interactivity” frames the discussion of these new candidate art forms, perhaps marking the divide between “new” and “old” media. While everyone seems to have something to say about the significance of interactivity, no one seems to have a clear understanding of just what makes something interactive.¹ Making matters worse, this theoretical imprecision is coupled with a general looseness in our everyday use of the term.² Unless we have a better understanding of the nature of interactivity, any claims about the nature of interactive artworks or the effects of interactivity on audiences will be suspect. Rather than risk talking past each other in our critical discussions, it is worthwhile to clarify our terminology.

Accordingly, in this article I attempt to develop a definition of “interactivity” that meets two sometimes incompatible goals: the definition should be in accord with our best intuitions on how the term should be used, and it should usefully differentiate interactivity from related but incompatible concepts with which it is often confused.³ I argue that the term “interactive” should be considered a general-purpose term that indicates something about that to which it is applied—whether this “something” is

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art, artifact, or nature. I base my definition on the notion of “interacting with.” First, I look for essential features of this relationship; second, using these features I develop a surprisingly simple definition of “interactivity” that can help distinguish the interactive from noninteractive arts. I argue that to be interactive, something must be responsive in a way that is neither completely controllable nor completely random.

Before developing a theory of interactivity, I analyze five problematic definitions: (1) Terrence Rafferty’s control theory, (2) Marie-Laure Ryan’s making use theory, (3) David Saltz’s input/output theory, (4) Dominic McIver Lopes’s modifiable structure theory, and (5) Janet Murray’s procedural/participatory theory.⁴ In each case, I reveal a problem that my final notion solves. After presenting a novel definition of “interactivity,” I defend the viability of my theory against several objections, including skeptical remarks that interactivity is a useless concept.

Five Theories of Interactivity

Control Theory

In an article in the *New York Times* on DVD technology, Terrence Rafferty complains that interactivity does not herald an age of fantastic new narratives but rather of unchallenging, audience-driven art.⁵ Rafferty sees interactivity as a form of control exercised by an audience that is unable or unwilling to submit to an artist. He thinks DVD chapter selection is just a bit less insidious than DVDs with alternative endings, and that the increasing ease of viewing DVD chapters according to one’s own order is symptomatic of a wider failure to submit to artistic vision by audiences in need of instant gratification. Rafferty argues that DVD chapter sequencing is continuous with choosing different endings of a story, which, in turn, is just a few steps from controlling the entire narrative. Perhaps the future Rafferty imagines is not entirely off base. Although not an official release, a version of the second *Star Wars* sequel with the Jar Jar Binks character removed circulated on the Internet soon after the theatrical release. Closer to a full manifestation of Rafferty’s nightmare, new endings were added to *28 Days Later* (dir. Danny Boyle, 2002) while it was still playing in theaters.

Rafferty’s worry is not that the ontology of the film is muddled by optional endings but rather that DVD chapter selection and alternate endings are part of a recent disturbing trend toward interactivity—a trend that is gradually phasing out the artist. As such, his criticisms of interactivity can be seen as an extension of Rousseau’s diagnosis of the popular theater: The theater is unable to teach because it must pander to the audience’s attitudes in order to be effective.⁶ Rousseau argues that “an author who would brave the general taste would soon write

for himself alone.”⁷ Rafferty thinks that rather than writing for the audience, interactivity skips this step and lets the audience write for themselves. Hence, interactivity is the final concession to the audience.

Rafferty would like to see audiences forced to submit to the will of directors. Accordingly, he considers the primitive format of the *Mulholland Drive* (dir. David Lynch, 2001) DVD as ideal. This DVD has no chapter selections and no extras; it is functionally indistinguishable from a VHS tape on disk. Hence, the *Mulholland Drive* disk lacks most of the features that people expect from DVD technology. Someone interested in studying a scene or obtaining a screen shot must go through a cumbersome process of fast forwarding. Since the viewer’s powers are somewhat diminished by the sparse menu, Rafferty considers this DVD less interactive than most.

My primary concern is not so much to assess Rafferty’s diagnosis of the perils of interactivity but to evaluate his use of the term. And it is fairly easy to see that the extension of his definition of “interactivity” is too broad, leading him to attack what he should see as perfectly benign technological advances. This indicates a fundamental problem with his use of the term, a problem that undermines the significance of the coming dangers he prophesies in the interactive future. Rafferty’s mistake is pervasive and causes difficulties for almost every proposed theory of interactivity. The fundamental problem is that Rafferty confuses interactivity with control—in this case, control over the order of information presentation.

It must be emphasized that Rafferty’s fears are clearly misplaced: DVD chaptering just affords a familiar ability. For hundreds of years people have been able to read novels out of order by skipping to particular chapters. Similarly, the chapter format of the DVD makes it easier to find a particular scene than it was with VHS, but there is no essential difference in the type of control the viewer has over the artwork.⁸ Someone can read book chapters out of order just as easily as they can watch DVD chapters out of order. Hence, any account of interactivity that includes DVDs would also have to include novels, but this is clearly unacceptable. Hence, we should reject Rafferty’s notion of interactivity because it is overly inclusive. Rafferty’s pessimistic pronouncements about the future of interactive art are unfounded. He has given us no reason to think that a genuinely interactive artwork will be under our control any more than a person is through our interactions. Rafferty’s fears reveal that in order to develop a more useful definition of interactivity, we need to see if clear distinctions can be drawn between interactivity and control.

Making Use Theory

In *Narrative as Virtual Reality*, the first book-length study of interactivity, Marie-Laure Ryan addresses the question of whether an interactive artwork can be immersive. In order to answer this question, Ryan turns to an

explication of what “interactive” means. Her analysis proceeds via three steps: first she discusses interactive mediums, then she presents interactivity as a continuum, and finally she charts interactivity on a Venn diagram. Unfortunately, her discussion of interactivity is troubled by several unclear distinctions. Over the course of the book, she discusses interactivity but never gives a formal definition of the term, despite her comment in the introduction that “a literal conception of interactivity . . . is easily defined.”⁹ Her easy but unsatisfactory definition is that to be interactive is to “make use of user input.” A cursory examination reveals that this criterion is far from sufficient and that Ryan’s ostensive definitions of interactivity are counterintuitive.

Ryan begins her discussion of interactivity by talking about interactive mediums but then switches first to talk of interactivity in general and then to interactive texts. She starts by defining interactivity in an ostensive manner, saying that TV is an inherently interactive medium. But if we assume that Ryan means the medium to be taken as the mode of presentation, it is unclear why a TV should be considered interactive. She fails to show how flipping channels on a TV is different in any relevant fashion from picking up a book and opening to a page. Again, as in the case of Rafferty, to think that DVD chapter selection or TV channel changing is interactive is to mistake control over the presentation of an artwork with interactivity.

I suspect that the somewhat popular notion that TV is interactive is a vestige of Marshall McLuhan’s argument that television is a “cold media”—one with less intense means of relaying information than so-called hot media.¹⁰ In his book on McLuhan, Paul Levinson explains that “the coolness of a medium, its invitation to fill in the details, comes not from the number of senses it engages, but from the degree of its intensity of engagements.”¹¹ McLuhan argues that the lack of visual information or the relative crudity of televised images gives them less power over the viewer. The viewer of TV, a cold medium, must fill in the image through participatory imagining. Although it is doubtful that the distinction between hot and cold media provides much useful clarification, it is clearly not suited to work as a definition of interactivity. When a video game is played on a high-resolution computer monitor, we do not want to say that it is less interactive than when played on a low-resolution TV or less interactive than a very fuzzy home video. The intensity of the display has nothing to do with whether an artwork is interactive or not.

Likewise, Ryan says that “the internet as a whole is an interactive medium,” but this is just as unclear as the TV reference.¹² If I construct a story that references real events and includes hyperlinks to related news stories, then I have used the Internet as part of the artwork; but why this should be considered interactive is unclear. I could just as easily write a story that includes these articles as appendices or instructs the reader to look them up. We should not overplay the difference between Web surfing and flipping

through hundreds of magazines that one could have around the house. The control offered by the Internet is only a more efficient instance of the kind of control one already has over print and televised media; the suggestion that there is a fundamental difference between the two is unsupported. As with TV, Ryan gives no argument for why the Internet should be thought of as an interactive medium; she simply stipulates its interactivity. Ryan's central problem is in defining interactivity too broadly as just "making use of user input," where "making use" can be almost anything.¹³

After discussing interactive mediums, Ryan attempts to lay out interactivity as a continuum, ranging from reactive interaction, to random interaction, to selective interaction, to productive interaction. Rather than discussing degrees of interactivity in general, two of the stages are "text" specific. She argues that "in the fullest type of interactivity, finally, the user's involvement is a productive action that leaves a durable mark on the textual world, either by adding objects to its landscape or by writing its history."¹⁴ This distinction is unclear and raises several questions. What is it to write the history of the textual world or to leave a mark on the textual world? Just what is the textual world?¹⁵ Do some artworks lack a text? If so, can nontextual art forms be interactive in the highest sense? It appears that Ryan's continuum has overlooked interactivity at the nontextual level, whatever that might be. I assume that "writing the textual world" could mean to alter the story, and "interact" could mean to have a productive role in the creation of the story itself. At times, however, Ryan sounds as if she means the literal textual work of the written word. This ambiguity lingers and causes trouble for the rest of her argument. If we are looking for a general definition of interactivity, examples confined to textual worlds or even narrative worlds are too specific for our purposes.

In the end, Ryan's criterion is not up to the task of explaining just what makes narrative artworks in particular interactive. The viability of her account partially depends on what it means to leave a durable mark on the textual world. Ryan explains that this requires either writing the history of the story world or adding objects to its landscape. Perhaps we can take Ryan to mean that an interactive narrative artwork is one where the events and existents (characters and setting) are alterable by the audience. If so, then the criterion is not necessary, since a highly narrative-integrated video game such as *Halo: Combat Evolved* (Bungie, 2001) is plausibly an interactive narrative artwork even though the narrative itself is, by most accounts, not interactive. Nevertheless, even if we had a clear understanding of what would count as meeting her criterion, it would not get us much closer to understanding what interactivity is. The proposed conditions are merely effects of interactivity—that is, a potential that it lends to narrative artworks. This leaves open the question, What is it that makes this possible?

After describing interactivity as a continuum, Ryan attempts to catalogue the various possibilities of interactive texts (in the selective and productive

senses of “interactive”) with a Venn diagram containing three overlapping circles—electronic, “ergodic,” and interactive. Rather than clarifying matters, the diagram increases ambiguity, since the notion of ergodic narratives is problematic. In Espen Aarseth’s formulation, ergodic texts require “non-trivial effort” for transversal;¹⁶ however, “non-trivial effort” is far too vague to distinguish hyper from normal texts.¹⁷ *The Big Sleep* (dir. Howard Hawks, 1946) requires nontrivial effort to follow the story, but it is not a hypertext and it is not an interactive artwork. Ryan takes a refined notion of ergodic to involve some sort of feedback mechanism whereby the text alters itself, but the distinction between this specialized notion of ergodic and interactivity is never made clear, and she has given us no reason to think that any more precision is possible.

To summarize, Ryan offers an analysis of what an interactive narrative would be like, but she never gives an adequate account of interactivity in general. Although her criterion may be necessary for interactivity, it is far from sufficient. The easy definition—“making use of input”—is far too inclusive if it means television and perhaps the novel are interactive. Hence, Ryan’s definition fails according to the two basic criteria I established for judging a candidate definition: (1) it fails to accord with our best intuitions on the matter, and (2) it fails to usefully distinguish between clear cases of the interactive and the noninteractive. The next definition that we will consider also suffers from being overly inclusive.

Input/Output Theory

In “The Art of Interaction: Interactivity, Performativity, and Computers,” David Saltz explores the relationship between interactivity and performance in art.¹⁸ He offers several conditions indicative of interactive computer art. In general, for a work to be interactive Saltz argues that the following events must occur in real time:

1. A sensing or input device that translates certain aspects of a person’s behavior into digital form that a computer can understand.
2. The computer outputs data that are systematically related to the input (i.e., the input affects the output).
3. The output data are translated back into real-world phenomena that people can perceive.¹⁹

Though these criteria may be necessary for there to be interactivity on a computer, surely they are not sufficient. Saltz implicitly acknowledges the insufficiency of the criteria, but he does not realize just how inadequate they are. Not only are they insufficient, but, as stated, the criteria for interactivity are unnecessary.

Like Ryan, Saltz attempts to construct something of a continuum of interactivity. Saltz sees interactivity increasing in three stages: from those with (1) triggers, to those with (2) control with coherence, to those with (3) responsiveness to constant streams of input. Saltz says that the first type can be found in “minimally interactive” CD-ROMs, which “simply collect together a group of what are, in effect, multiple autonomous presentations.” This notion of interactivity is akin to Rafferty’s notion that includes DVD chapter selection. Similarly, it is not clear why Saltz wants to call this interactivity at all since he acknowledges that “[t]his type of ‘interactivity’ is no different in kind from that afforded by a printed anthology or encyclopedia, or, for that matter, a record player.”²⁰ It is likely that interactivity comes in degrees, but no analysis should entail that dictionaries are typically interactive, in even the most minimal sense. Rather than acknowledging the over-inclusiveness of his criteria, Saltz’s accepts this consequence, thereby compromising the plausibility of his theory.

His second level of interactivity—that exemplified by hypertext fiction—fairs no better. Saltz again makes the same mistake as Rafferty in thinking that control is somehow synonymous with interactivity when he says “[a] hypermedia interface . . . gives viewers control over what they will see and hear at any given moment.”²¹ This kind of control cannot distinguish the interactive from the noninteractive, however; a cross-referenced encyclopedia or even a record player can provide the same kind of control. Since Saltz’s notion of interactivity allows everything, it is not surprising that virtual reality is an example of his third and highest level.

What appears to have happened is this: Saltz takes a paradigm case of interactivity—virtual reality—pinpoints its basis in computer technology, and then assumes that anything on a computer must therefore be interactive. The problem is that Saltz’s computer-restricted description of interactivity does not tell us much about interactivity in general, since it asks us to conflate interactivity with an extremely high-level description of the way computers process user input. If a computer can simulate a record player or a novel, it is, however weakly, interactive according to Saltz’s notion. But this is absurd. Of course a computer program has to “translate certain aspects of a person’s behavior into digital form that a computer can understand,”²² but what does this tell us about interactivity? Saltz provides a high-level, albeit obvious, description of the way computers process input, but we should not consider CD-ROMs interactive just because they are read on computers.

Saltz’s criteria are unnecessary since there can be interactive artworks that are not computer-based. His criteria are also insufficient since they are overly inclusive by his own admission. As a result, Saltz’s definition fails to satisfy the simple criteria that a successful definition of interactivity should

meet; this makes it of little value as a means of increasing our understanding about the nature of interactivity.

Modifiable Structure Theory

Dominic McIver Lopes offers a theory of interactivity that purports to avoid the overinclusiveness of the theories proposed by Rafferty and Saltz. Unfortunately, Lopes's analysis brings us no closer to a satisfactory definition.²³ Lopes begins by describing what he thinks is the standard account of interactive media. On the standard account, interactive media are those where users can "control the sequence in which they access content." Unlike Rafferty, Lopes recognizes that this definition is far from adequate since it counts such things as DVD chapters, card catalogs, books with tables of contents, and even footnotes as interactive. Although he thinks that this definition cannot do any useful work, for some unspecified reason Lopes decides not to completely reject this concept of interactivity; instead, like Saltz, he thinks of it as a lower form of interactivity found in "weakly interactive media."

Lopes attempts to develop a definition of interactivity that is more useful than the simple control theory. He calls the concept "strong interactivity." Whereas weakly interactive media merely allow users to control the order of information presentation, strongly interactive media allow users to modify what Lopes calls the "structure." Recognizing that the term "structure" is extremely vague, Lopes proceeds to define "structure" as properties of a thing that are relevant to its aesthetic appreciation. Here is Lopes's explanation in full:

In strongly interactive media we may say that the structure itself is shaped in part by the interactor's choices. Thus strongly interactive artworks are those whose structural properties are partly determined by the interactor's actions. By a work's "structural properties" or (more briefly) "structure" I mean whatever intrinsic or representational properties it has the apprehension of which are necessary for aesthetic engagement with it—sound sequences in the case of music and narrative content in the case of stories.²⁴

Lopes intends for this definition of "strong interactivity" to solve the problems of the weak theory. At first glance this may seem like an improvement upon the simple control theory, but under a more considered inspection Lopes's definition proves to be wildly overinclusive, amounting to nothing more than the rejected weak theory.

The first thing one must notice about Lopes's theory is that it does not provide a general definition of interactivity; instead, it is presumably restricted to media, but the only explanation we are given of "structure" is in relation to artworks. Even if we are only looking for a definition of interactive art, there is no reason to suppose that what makes an artwork interactive is

always aesthetically relevant. Putting this problem aside, there are several other decisive objections one can raise against Lopes's definition.

The principal problem with his theory is that it fails to distinguish between what he calls "weak" and "strong" interactivity. On his account, the structure of an artwork includes any intrinsic or representational properties that are relevant²⁵ to aesthetic engagement. One such property is the order of the narration, but Lopes denies that order is structurally relevant. In a discussion of hypertexts and why they frequently fail to be strongly interactive, Lopes claims that "although the user may read about the narrated events in any order, this does not change the order of the narrated events themselves, nor indeed, the order in which they are narrated. And it is these that comprise the structure of the work."²⁶ But surely this is not right. If we alter the order of the chapters in a novel, we change the narration, which is, after all, the conveyance of narrative information. The order in which narrative events are presented is highly relevant to our aesthetic experience of narrative artworks. It is the basis for numerous narrative experiments such as the movie *Memento* (dir. Christopher Nolan, 2000) or the novel *Happy Baby* by Stephen Elliott,²⁷ where the story is told backwards to achieve radically different affective reactions than it would have if the story had been presented in standard chronological order. Hence, the audience's ability to control the sequence in which they access the content would be relevant to their aesthetic experience of the object. On Lopes's account, therefore, the user of a novel or a DVD with chapter selections is able to partially determine the "structure" of the artworks. Hence, according to Lopes's definition, novels and DVDs should be considered strongly interactive. Therefore, Lopes's definition fails to differentiate between "weak" and "strong" interactivity. Since the definition of weak interactivity is inadequate, so is Lopes's definition of strong interactivity.

Although the above objection shows that Lopes's definition is no better than Rafferty's or Saltz's there are further problems. Like Ryan's account, Lopes's definition accidentally includes TV as an interactive medium. Certainly the color, contrast, and brightness of a film or video are important intrinsic properties that are relevant to our aesthetic experience of videos. Since users of a television, through standard controls, can modify the color, contrast, and brightness of the display—even making a color movie black and white if they see fit—they can modify what Lopes considers the "structure" of the work. On Lopes's definition, this makes all television programs strongly interactive. Similarly, the use of a stereo equalizer suddenly makes all recorded music interactive on Lopes's account. Even if we add a proviso that the adjustment needs to be dictated by the work, a hip-hop song that instructs the listener to "pump up the base" would make the work interactive. Clearly this is an unacceptable consequence, one that warrants a rejection of Lopes's definition of interactivity.²⁸

Procedural/Participatory Theory

So far, we have looked at four inadequate attempts to define interactivity: Rafferty's control theory, Ryan's making use theory, Saltz's input/output theory, and Lopes's modifiable structure theory. Another attempt can be found in *Hamlet on the Holodeck*, wherein Janet Murray argues that to be interactive is to be procedural and participatory.²⁹ I will briefly argue that procedures have nothing to do with interactivity, and that the participatory criterion is a confusing way of talking about what is better described as responsiveness.

One suspects that Murray's discussion of the procedural nature of interactivity has to do with the computer programming paradigm prevalent when she wrote the book. Procedural programming languages are an assemblage of interrelated procedures that can invoke one another and themselves recursively. A procedure is much like a mathematical function: it is fed input or "called" to manipulate data or perform some task. By focusing on a technological implementation, Murray commits the same associative mistake as Saltz. Just because much interactive art is software-based, this does not mean that interactivity is procedural in a meaningful sense. In common usage a procedure is an ordered process that one follows under certain circumstances. A complex interactive artwork, even if executing procedures, does not necessarily give the appearance of doing so, at least in our ordinary understanding of a procedure. We can see that this criterion is unnecessary; for example, a happening can be interactive, but we would not call it procedural in this technical sense. Again, we should not confuse an implementation of interactivity with its essence.

Although her definition is inadequate, Murray's emphasis on the participatory nature of interactivity may reveal an important aspect of the concept. On Murray's account, for something to be interactive it must be participatory. Unfortunately, she never gives a complete account of what it means to "be participatory." Participation is best thought of as a behavior ascribed to agents who are helping us to achieve some goal. It carries with it connotations of cooperation, which we do not feel in response to many interactive works; but perhaps this is not a necessary condition. We can participate in a debate with an opponent who is working toward a different goal, winning the argument for her side. More fundamentally, to call an activity participatory seems to imply that we react to or are reacted to by another agent.

If interactivity is a form of participation, then the perception of agency might be necessary for there to be interactivity. Perhaps the perception of agency is typical of paradigm cases of interaction; however, this requirement seems too strong. Consider an interactive video installation called "living room" that presents the façade of a living room window with a monitor directly behind the glass. When someone comes near the installation,

an image of a dog appears on the monitor. The dog tracks the viewer's movements and responds by barking, growling, or just staring menacingly. Although the label "interactive" fits this artwork, I find it unusual to say that I am participating in this artwork or that I perceive some agency on the part of the TV dog or its control mechanism. But intuitions are unclear here. Rather than participating with something in the artwork, we can, as Saltz suggests, without controversy say that the artwork is *responsive*.

So far we have examined five inadequate definitions of "interactivity." After a nearly comprehensive survey of the literature, we have come up empty-handed. I turn now to develop a new definition of "interactivity," using the insights that we have gained along the way.

Interacting With

According to common usage, "interaction" best describes a kind of behavior one engages in. To get a handle on the concept we must explain just what kind of behavior is interactive and what kinds of things are interactive. Most commonly, we speak of *interacting with* another person, and the most typical form of interaction is a conversation: we interact in a conversation when we say something and another person responds with a relevant question, comment, criticism, or elaboration. Using a conversation as a paradigm of interaction, we can distill the essential features of interactivity.

The important features of a successful interaction with another person can be thrown in relief by comparison with pathological cases. If someone refuses to respond to our questions and spits out one non sequitur after another, then we would not say that we were interacting with that person. Although we may be able to cause spasmodic reactions, when someone responds in a seemingly random way we do not interact with them; we do not say that we interact with abject insanity. On the opposite end of the spectrum, if a person only repeats our questions, translates our speech into another language, or barks once for each syllable we utter, then, again, we would not say that a successful interaction takes place. These two pathological poles of human conversation indicate that neither random reactions nor predictability bordering on limited control are characteristic of interactivity; rather, it must be that a certain kind of responsiveness absent of control and predictability is necessary for there to be interaction.

The pathological conversational cases indicate that there is a difference between something that is interactive and something that is merely responsive. A good account of the difference is that interactivity is a type of responsiveness where the response is not completely determinable. In this sense, most musical instruments are plausibly thought to be interactive: only a virtuoso can get an instrument to do exactly what she wants some of the time. Conversely, record players, DVD players, the Internet, stereo equalizers, and

TVs are not interactive since their responses are completely determinable, absent of hardware or software malfunctions.

Defining “interactivity” will at least require specifying at what level the determination of the response makes it interactive. Responsiveness is part of interactivity, but it is not the entire story. There are two dimensions of responsiveness along which interactivity can be measured: its degree and its type. In one sense of the term, “responsiveness” indicates the amount of output per input, gauged in speed and intensity. To say that a car is very responsive means that it responds quickly to our input or has the power to accelerate on demand. In defining interactivity, however, the type of responsiveness is more important than the degree. As the examples of pathological conversations show, one cannot interact with something that is completely controllable, nor can one interact with something that responds in random, completely unpredictable ways. The kind of response an interactive thing gives is somewhere between controllable and just random.

One can repeatedly respond to something, such as randomly falling rocks from a cliff, without interacting with it. Though it may seem to be the case, a cliff does not respond to anyone’s position below and adjust the falling rocks to her location. However, if I am dodging firecrackers thrown by my cousin, who is aiming at me, then I am interacting with my cousin. Likewise, one does not interact with their car so much as they do with other drivers, unless your car has an exceptionally bad alignment problem. If we cannot interact with falling rocks but we can with a sadistic cousin, then we can safely say that interactivity requires some kind of mutual responsiveness. Accordingly, we can say that for something to be interactive it must be able to respond in a particular way.

Often, interacting with something takes the form of trying to gain control. Interaction often occurs in the process of training, or skill development, where one becomes attuned to how something will respond. Interactive objects are conspicuous; to use Heidegger’s terminology, they are not yet ready-to-hand.³⁰ Typically, the amount of interaction diminishes as one becomes more skilled at a task or gains additional powers over the world. For example, one does not have to interact much with a well-trained horse that can be controlled by subtle shifts in the rider’s weight. In general, in learning to use something one can be said to be interacting with it and only later does one become able to control it. Our ability to improve our powers of control makes novelty the source of most forms of interactivity.

So far, we have determined that for something to be interactive, it must be responsive. We also found that the kind of responsiveness characteristic of things we are interacting with cannot be completely random or entirely predictable. Having explored some of the features of the candidate type of responsiveness found in interacting with something, we can proceed to systematize the findings. Given the preceding discussion, I propose this analysis of interaction:

X and Y interact with each other if and only if (1) they are mutually responsive, and (2) neither X nor Y completely control the other, and (3) neither X nor Y responds in a completely random fashion.

Based on this relation we can derive a definition of interactive:

Something is interactive if and only if it (1) is responsive, (2) does not completely control, (3) is not completely controlled, and (4) does not respond in a completely random fashion.

The above definition captures the preceding observations about the characteristics of interactive behavior. With these features in mind, we can begin to specify just when something might be said to be interactive.

Interacting with something is much like trying to control it, testing to see how it will respond. It is crucial to note that we must not be able to infallibly predict the response of that with which we are interacting. If we can reliably predict the response and there are no other ways in which we can act on the thing, then there is no longer interaction—there is merely control or manipulation. For the thing to remain interactive for us there must be forms of input that result in responses that we cannot accurately predict. If this is correct then nothing is interactive for an omnipotent being, since it would be able to fully control anything and everything. Clearly, then, interactivity must be a relational, not an intrinsic, property. In themselves, things are not interactive; it is only in relation to our ability to control something that it is interactive *for us*.

As the preceding discussion indicates, we can interact with our environment until we can completely control it. Perhaps a new word processing program can be interactive for us until we master its workings. We can interact with it at first, but soon, if we are lucky and spend too much time exploring its various features, the program will become a mere tool. Using “interact with” as the root concept, we can say that something is interactive if we can interact with it. Given the contingency of the interactive situation, in order to clarify when the label “interactive” applies, we need to come up with a notion of interactive where the standard person could interact with the object. Since interactivity may be fleeting even for the standard person, however, we would have to come up with a standard state of the standard person, or the ideal state of the ideal person, in order to determine a standard of correctness for the item. I only offer a rough sketch of what kind of a standard may be adequate.

Take the game of tennis as an example. Normally, when playing tennis the players respond to each other in a way typical of interactivity. When they are playing the players are interacting: neither player is responding in a random fashion, hitting balls up in the air or merely yelling obscenities at the racket. When the skills of the players are well-matched and they are playing the game, neither player can completely dominate the other. If you put into play a rank amateur and a professional tennis player, the pro

may be able to control her opponent, moving him from side to side or never allowing a single shot to be returned. With such an imbalance in skill, the game becomes increasingly noninteractive. This indicates that calling something interactive is not to say that it is necessarily interactive, only that it is *necessarily typically* interactive. Apart from the special cases of extreme incompetence and mastery, the game of tennis is necessarily typically interactive for humans of some standard range of abilities. Based on this observation, we might say that something is *maximally interactive* when it cannot be mastered and *minimally interactive* when mastery comes easily; most prominent forms of interactivity fall somewhere in between.

After the first version of the *Pac Man* (Namco, 1980) video game was released, complex patterns of movement were discovered that allowed players to successfully evade capture. Players who mastered these patterns were able to gain a level of control over the game whereby it ceased to be interactive for them. Nevertheless, *Pac Man* should still be considered interactive since the typical player lacks this level of control. Although *Pac Man* is not necessarily interactive, it is necessarily *typically* interactive, since the typical player without extreme cognitive and physical deficits can enter into the kind of responsive relationship with the game that is characterized neither by controlling nor by completely random action.

Using some basic examples and a simple technique for isolating important features of a paradigm case, I offered a *prima facie* plausible definition of “interactivity” that escapes the difficulties facing theories such as Rafferty’s. For further clarification, I turn now to address several objections to my definition. I will also show how my definition can dispel skeptical doubts about the usefulness of the concept of interactivity.

Objections

My definition of interactivity has two basic parts. I claim that something is interactive for an individual if it responds in a way that is neither (1) radically random nor (2) almost completely controllable. One may take issue with either part of my definition. As an initial objection, one may argue against the first criterion by making reference to random but still interactive works. Consider John Cage’s *4’33”*. The work is intended to capture the unpredictable sounds present in a concert hall, drawing our attention to the infinite variety and randomness of everyday experience. The work brings the various background sounds in the performance hall into the foreground, thereby making sounds that would otherwise be considered interference constitute the work itself. The objection concludes that in *4’33”* we find interactivity in randomness. In reply, I merely need to note that although the sounds the audience makes become part of the work, there is no reason to think that *4’33”* is interactive. Simply put, there is no interaction—neither

between the audience and the pianist nor between the various audience members. The pianist sits there. The audience members cough and shift in their seats. Machines bang away outside. The whale of passing sirens seeps into the performance hall. The work becomes an aggregate of these miscellaneous sounds, but there is no interaction; there is simply aggregation.

It is worth noting that this objection raises other important issues, but not with my definition of interactivity. Although I am ultimately interested in interactive artworks, my goal in this article is to define "interactivity," not "interactive art." There are a host of separate issues surrounding interactive art, such as what constitutes the work. Another set of questions concerns the role of the audience. To be interactive must an artwork be partially constituted by audience activity? What about improvisational jazz works, where the interaction is among the performers. Are such works interactive? Can a clear distinction be drawn between the audience and performers in interactive artworks? These are important questions that all are outside the scope of this article.

One may also object to the second part of my definition. I argue that if something is completely controllable, then it is not interactive for the person who can completely control it. One may ask, What about a video game where I simply shoot an alien and it dies? This seems to be a fairly typical interaction with a video game, and video games are a paradigm of interactivity. In reply, I would argue that if this is all there is going on in the game, then it will not be interactive for long. I discussed a very similar scenario in relation to *Pac Man*, for which there were patterns of movement that result in completely successful avoidance of the ghosts. For players who discover these movements, the game ceases to be interactive. When you develop complete mastery over something, it ceases to be interactive *for you*. Again, my claim is that interactivity is a relational property, not an intrinsic property of an object. Not only does an easy game cease to be interactive for you, it ceases to be interesting. Game designers are keenly aware of this situation and employ specialists who "balance" games. A balanced game is one where the difficulty increases as the player's skill is improved. Nearly all video games become increasingly more difficult as you progress through the levels, so it is not true that the simple situation at the heart of this objection is characteristic of video games or other interactive media.

Rather than object to the particular features of my definition of "interactivity," one may argue that the very concept should be abandoned for more specific terms. In a section entitled "The Myth of Interactivity" in *The Language of New Media*, Lev Manovich explains why he does not use the term "interactive" without qualification, saying "I find the concept to be too broad to be truly useful."³¹ He gives two separate arguments for why we should not expect the term "interactivity" to be very helpful. Both arguments are inherently flawed, and taken together they are inconsistent since each uses a different definition of the term.

In his first argument against the viability of the term “interactive,” Manovich argues that the modern human computer interface

allows the user to control the computer in real-time by manipulating information displayed on the screen. Once an object is represented in a computer, it automatically becomes interactive. Therefore, to call computer media “interactive” is meaningless—it simply means stating the most basic fact about computers.³²

From the preceding discussion of why we need not confuse interactive with controllable, we should be skeptical of Manovich’s hasty conclusion. Rather than trying to develop a useful notion of “interactivity,” Manovich accepts the weakest definition he can find and reduces it to absurdity. With such a weak basis, it is hard to see how the qualified uses of the term that Manovich employs, such as “menu-based interactivity,” can work with any precision. Like Rafferty, Manovich essentially conflates interactivity with control. In this sense, almost everything is interactive and the concept is practically worthless. However, I hope to have shown that a more useful notion of interactivity can be developed.

Manovich’s second argument against interactivity is that most art is already interactive—that is, if we take “interactivity” as meaning something like requiring an active audience. He argues that “All Classical, and even more so modern, art is ‘interactive’ in a number of ways. Ellipses in literary narration, missing details of objects in visual art, and other representational ‘shortcuts’ require the user to fill in missing information.”³³ Rather than showing that all art is interactive, Manovich offers reasons for thinking that all art requires some activity on the part of the audience. If we do not conflate interactivity with mere audience activity, then there is no reason to jettison the term. Manovich’s first argument shows that a definition of interactivity as control is hopelessly inclusive; his second argument shows that interactivity cannot be conflated with audience activity. Neither shows that a more precise definition of interactivity cannot serve a useful purpose in identifying a potential found in some artworks.

If we are trying to distinguish between an online hypertext article and a print magazine article, as Manovich is trying to do, then the notion of interactivity will not be very useful, since any plausible formulation that includes all hypertext will also include all print media—just as Rafferty’s definition could not distinguish DVD chapter selection from what is available in a novel.³⁴ DVD chaptering is not interactive, and neither is hypertext fiction. Hence, any definition of interactivity that includes hypertext in its extension would be overinclusive. If we accept something like my definition of interactivity as a particular type of responsiveness, however, then the term can do useful work. For instance, my definition of interactivity makes a clear distinction between the interactive potential in animation and video

games. That animation is not responsive in the appropriate fashion and that video games are marks a fundamental distinction, one that indicates many possibilities only present in the latter.

Conclusion

In the last chapter of *Principles of Art*, R. G. Collingwood complains that mechanically reproduced art is essentially flawed because the medium of transmission prohibits artworks from being “concreative.” Collingwood argues that in mechanically reproduced art,

the audience is not collaborating, it is only overhearing. The same thing happens in the cinema where collaboration as between author and producer is intense, but as between this unit and the audience nonexistent. Performances on the wireless have the same defect. The consequence is that the gramophone, the cinema, and the wireless are perfectly serviceable as vehicles of amusement or of propaganda, for here the audience’s function is merely receptive and not concreative; but as vehicles of art they are subject to all the defects of the printing-press in an aggravated form.³⁵

This is the first and only time Collingwood uses the term “concreative” in this book, and just as Collingwood himself left the notion somewhat unexplained, concreativity has been almost completely ignored in the philosophy of art.

In *A Philosophy of Mass Art* Noël Carroll makes one of the few contemporary references to Collingwood’s term.³⁶ Carroll sees Collingwood’s criticisms of non-concreative art as one species of the passivity charge against mass art: the claim that mass art is inherently defective because it reduces the audience to unthinking receptacles, thereby prohibiting the free play of the imagination that genuine art provokes. On this reading, Collingwood is complaining that the audience is made a mere receptacle by mass art and that mass art is thereby defective in virtue of its pacifying effect. Although this may be part of Collingwood’s criticism, I think his emphasis lies elsewhere. Rather than criticizing mass art for its pacifying effect on the audience, Collingwood is diagnosing what he sees as a source of limitation on the expressive potential of mechanically reproduced art. It is not the artwork’s supposed deleterious effects on the audience that is at issue but the inability of the audience to provide feedback to help the artist create the most effective work possible.

Collingwood points out a feature of mass art that Walter Benjamin noticed in “The Work of Art in the Age of Mechanical Reproduction,” which was written in 1935, three years earlier than the publication of *The Principles of Art*. Benjamin argues that in mechanically reproduced art the potential opens up for the artwork to fall out of step with the audience and loosen

its immersive grip, thereby providing conditions likely to spark a critical attitude. He says that “the film actor lacks the opportunity of the stage actor to adjust to the audience during his performance, since he does not present his performance to the audience in person. This permits the audience to take the position of a critic.”³⁷ Rather than playing up the supposed politically liberating potential of this limitation of mechanically reproduced art, Collingwood laments the handicap.³⁸

Like Rafferty, Collingwood sees concreativity as the most pronounced form of audience control and creative dependence. Collingwood’s discussion of concreativity comes at the end of a chapter called “The Artist and the Community” that is essentially a long attack on the naïve view of the autonomous creativity of artistic genius. He begins by arguing for a fairly obvious conclusion: artistic production never occurs in isolation, since an artist always operates in a context where other art and artists influence his or her work. Not only is the artist influenced by others, but for some goals she is constrained by the tastes and dispositions of the audience that make it responsive to particular techniques. Taking this a step further, in performed artworks the artist must generally collaborate with directors and actors who also assert some creative control. In addition, performed artworks have the potential to allow the audience to partially create the production because the actors can respond to audience reactions, thereby allowing the work to be concreative. Unlike Rafferty, Collingwood sees the diminished role of the artist in concreative art as nothing but a more pronounced occurrence of the nature of artistic production.

Although I am skeptical of the benefits interactivity affords, interactive artworks are significant in that they are the first instances of mass art³⁹ to be truly “concreative.” It might come as a surprise to Benjamin and Collingwood when I suggest that mechanically reproduced artworks⁴⁰ can be interactive and hence concreative. Such is technology.

By looking at pathological cases of a paradigmatic interactive activity—a conversation—I discerned two kinds of responsiveness that are inimical to interactivity. I then proposed that interactivity is a kind of responsiveness that is neither random nor fully controllable. Contrary to the most common definitions of interactivity, I argue that interactivity and control are incompatible. Confusing interactivity with control is the central mistake underlying the counterintuitive suggestions that novels, TVs, and DVD players are interactive. My definition is more restrictive than most, but it does not confine interactivity to a particular medium, such as computer technology; even a stage play could be interactive if it was appropriately responsive to audiences.

Recent computer technology has made interactivity possible for mechanically reproduced art forms, whereas previously interactivity in art was restricted to live performances. Although in a mechanically reproduced

interactive artwork the artist only indirectly responds to the audience by establishing responsive devices, such works are able to respond to audience input, giving them “concreative” potential. In order to be concreative the artwork must be shaped by both the artist and the audience. Computer-based interactive art is not only able to respond to boos and laughter but to a more extensive set of audience behavior. Whether concreativity truly affords a potential that lends much to the achievement of artistic excellence is a highly suspect claim. Nevertheless, interactivity alleviates this supposed deficit of mass art, thereby affording concreative potential to a much larger class of artworks than Collingwood could have foreseen.

NOTES

- I thank Heidi Bollich, Robert Howard, Noël Carroll, and an anonymous referee for this journal for useful comments on early drafts of this article.
1. Several of the articles in a collection called *ScreenPlay* attempt to explore the differences between cinema and videogames by asking what difference does interactivity make; however, none of the contributors gives any indication of what they mean by “interactivity.” Tanya Krzywinska and Geoff King, eds., *Screen-Play: Cinema/Videogames/Interfaces* (New York: Wallflower, 2002).
 2. What amount of disagreement would we find were we to ask a group to classify the ten object/activity pairs below into the interactive and the noninteractive?
 1. A novel : reading
 2. A choose your own adventure story : choosing which section to go to
 3. A stereo : adjusting the volume or the equalizer
 4. A DVD player : skipping to a scene
 5. A word processor : using an advanced formatting option
 6. An avant-garde participatory play : participating
 7. A first-person shooter video game : playing the game
 8. A mound of clay : molding it into a sculpture
 9. A person : talking to a friend
 10. A violin : playing a song
 3. Of course, there might be controversial borderline cases. My goal is to develop an analysis that can explain the clear cases. Ideally, a good analysis will help us adjudicate the borderline cases.
 4. Since the topic of interactivity has received very little sustained philosophical analysis, three of the five definitions of interactivity that I analyze are from non-philosophers. However, all the theories are philosophical in that they purport to tell us something about the nature of the subject. I hope to show that the topic does have philosophical interest and is worthy of further attention.
 5. Terrence Rafferty, “Everybody Gets a Cut,” *New York Times*, May 4, 2003. Although not a philosophical article, it is instructive since Rafferty adopts the most common notion of interactivity, one that has influenced theoretical writings on the topic. This article is reprinted in *Philosophy of Film and Motion Pictures*, ed. Noël Carroll and Jinhee Choi (London: Blackwell, 2006).
 6. Jean-Jacques Rousseau, *Politics and the Arts: Letter to M. D’Alembert on the Theatre*, trans. Allan Bloom (Ithaca, NY: Cornell University Press, 1960).
 7. *Ibid.*, 19.
 8. Rather than allowing viewers to control the artwork, through audio commentary and other special features, DVD technology allows audiences easier access to authorial intention and production history than has ever been possible.

9. Marie-Laure Ryan, *Narrative as Virtual Reality: Immersion and Interactivity in Literature and Electronic Media* (Baltimore, MD: Johns Hopkins University Press, 2001), 17.
10. For an early development of McLuhan's distinction between hot and cold media, see Marshall McLuhan, *Understanding Media* (1964; reprint, Cambridge, MA: MIT Press, 1994).
11. Paul Levinson, *Digital McLuhan: A Guide to the Information Millennium* (New York: Routledge, 1999), 106.
12. Ryan, *Narrative as Virtual Reality*, 205.
13. *Ibid.*, 206.
14. *Ibid.*, 205.
15. Ryan attempts to explain that a "textual world" is an imagined world represented by the text, but she uses the term ambiguously throughout the text. Often it is used in a language-specific manner: "For the purposes of immersive poetics, a crucial implication of the concept of a textual world concerns the function of language" (91). It is not clear exactly what she has in mind, especially whether it is language- or narrative-specific.
16. Espen Aarseth, *Cybertext: Perspectives on Ergodic Literature* (Baltimore, MD: Johns Hopkins University Press, 1997).
17. This is not to say that Aarseth does not try to distinguish between comprehending a narrative and the effort required from "ergodic" literature, but I do not think he is successful.
18. David Saltz, "The Art of Interaction: Interactivity, Performativity, and Computers," *Journal of Aesthetics and Art Criticism* 55, no. 2 (Spring 1997): 117-27.
19. *Ibid.*, 118.
20. *Ibid.*, 120.
21. *Ibid.*
22. *Ibid.*
23. Dominic McIver Lopes, "The Ontology of Interactive Art," *Journal of Aesthetic Education* 35, no. 4. (Winter 2001): 65-81.
24. *Ibid.*, 68.
25. Lopes says that the properties must be "necessary" for aesthetic engagement. He seems to mean that the properties must be considered if one is aesthetically evaluating the artwork. Hence, I suppose he just means that the properties are aesthetically relevant. Since I can't make sense of the "necessary" as meaning anything other than "relevant," I've chosen to use "relevant" to avoid incurring further confusion. I do not think that this has any effect on the strength of Lopes's definition.
26. *Ibid.*, 68.
27. Stephen Elliott, *Happy Baby* (New York: Picador, 2004).
28. Although Lopes's theory of "interactivity" is inadequate, it is largely irrelevant to the main purpose of his article, which is to discuss the ontology of interactive art. On the metaphysical issues, Lopes's discussion is highly insightful and worthy of careful study.
29. Janet Murray, *Hamlet on the Holodeck: The Future of Narrative in Cyberspace* (Cambridge, MA: MIT Press, 2000).
30. Heidegger describes the phenomenology of conspicuousness in section 16 of Division One of *Being and Time*. See Martin Heidegger, *Being and Time*, trans. John Macquarrie and Edward Robinson (New York: Harper One, 1962), 104.
31. Lev Manovich, *The Language of New Media* (Cambridge, MA: MIT Press, 2001), 55.
32. *Ibid.*
33. *Ibid.*
34. I do not claim that my definition implies that all hypertexts are noninteractive. Given sufficient complexity, framing, and restrictions on our control, hypertext could plausibly become interactive. Timing devices used in conjunction with

- textual displays that require mouse movement to reveal text and images could be used to create an interactive hypertext work.
35. R. G. Collingwood, *The Principles of Art* (New York: Oxford University Press, 1938), 323.
 36. Noël Carroll, *A Philosophy of Mass Art* (Oxford: Clarendon Press, 1998), 102.
 37. Walter Benjamin "The Work of Art in the Age of Mechanical Reproduction," in *Film Theory and Criticism*, ed. Gerald Mast, Marshall Cohen, and Leo Braudy (New York: Oxford University Press, 1992), 672.
 38. In this article I am not concerned with whether or not Collingwood's remarks on the value of concreativity are consistent with his larger theory of art.
 39. Here I am adopting the meaning of "mass art" developed by Carroll in *A Philosophy of Mass Art*.
 40. I would argue that some video games would fit the bill. Although for the current article I assume that some video games can be considered art, this does not beg any relevant questions, since there are other interactive art forms. My argument does not rest on the art status of video games. For an exploration of the issue, see Aaron Smuts, "Are Video Games Art?" *Contemporary Aesthetics* 3 (2005). Available online at <http://www.contempaesthetics.org/newvolume/pages/article.php?articleID=299>.